Scientific and Ethical Problems on Energetic Impact Exploration against Minor Planets

Masahisa Yanagisawa[1]

[1] Univ. Electro-Communications

An about 400 kg impactor hit the comet 9P/Tempel 1 at 10 km/s in Deep Impact cometary mission of NASA. Spectacular images where the impact ejected cometary material from Tempel 1 attracted the masses. However, I suspect the scientific validity of the energetic impact exploration without detailed non-destructive mapping/probing prior to the impact exploration. On the other hand, comets are important celestial objects for some people (some researchers, astrologist, and so on). There were peoples who simply felt pity for the comet. NASA paid no attention to such non-scientific objections. I suspect the ethical validity of the NASA's attitude. I discuss the scientific and ethical guide-lines for the future energetic impact explorations.

1. Characteristics of the Deep Impact Exploration

(1) Energetic impact exploration

Impact energy used to explore the inside of the comet by Deep Impact Mission is equivalent to 4 tons of TNT explosive. People, for whom comets occupy important part of their mind, have every reason to think against such exploration.

(2) Simple and cheap exploration

There is no need decelerating spacecraft to have a rendezvous with or orbit an object for detailed observation.

(3) Technical challenge

Shooting a fast moving small object is a technical challenge.

(4) Spectacular output

Images or motion pictures of impact phenomena are attractive for the masses.

(5) Participation of worldwide observers

Worldwide astronomical observatories can participate freely and play important part in the project.

(6) Space guard rationale

The following rationale can be emphasized; we must learn how to deflect or destroy minor planets before they hit the Earth.

These characteristics make energetic impact exploration attractive. Deep Impact type missions may be sent to minor planets one after another in near future.

2. Scientific Problems

(1) Contamination

Deep Impact could have caused the contamination of the comet by the spacecraft materials.

(2) Validity as a scientific method

Energetic impact exploration before detailed non-destructive exploration would not be valid in terms of scientific method. It would not be good either in terms of scientific education.

3. Ethical Problems

(1) Presence of people who do not like energetic impact exploration

The comets and asteroids are important celestial objects for some people. They may not want energetic impact exploration against the minor planets. It is quite natural for some people to think against the impact exploration whose energy is more than equivalent to usual bombs.

(2) Persuasion or convincing for non-scientific objections

Celestial objects are not possessions of scientists. There are non-scientific objections against energetic impact explorations. Scientists must make faithful effort to persuade or convince them to allow the explorations.

4. Conclusions

(1) Even in the case that energetic impact exploration is essential, it must be preceded by non-destructive detailed exploration of target object.

(2) Scientists must make faithful effort to persuade or convince for non-scientific serious objections. For the reason that the objections are not based on sciences, scientists should not neglect the effort.